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10/577,971	07/14/2009	Igor Lvovich Skryabin	GRIHACP47AUS	1385

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THEODORE, MAGALI P	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,971	SKRYABIN, IGOR LVOVICH	
	Examiner	Art Unit	
	Magali P. Théodore	1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 October 2009*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *102-131* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *102-121 and 124-131* is/are rejected.

7)☒ Claim(s) *122-123* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 May 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/3/2006, 5/30/2006, 10/7/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 131 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite in that it fails to point out what is included or excluded by the claim language. This claim is an omnibus type claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 102-104, 121, 124, 126 and 130 are rejected under 35 U.S.C. 102(b) as being anticipated by **Nakata** (US 5,785,768). The Oxford English Dictionary, henceforth **OED**, is relied upon to provide a definition.

Regarding **claim 102**, Nakata teaches a photovoltaic device including a titanium dioxide coating which forms an envelope with two curved portions (figure 1(b):7). On the inside surface of the envelope is a photovoltaic element comprising two discrete n^+ layers. The OED broadly defines a film as an extremely thin lamina of any material ("film," definition 2.a.). By that definition, Nakata's n^+ layers are film layers.

Regarding **claim 103**, Nakata's titanium dioxide envelope (figure 1(b):7) forms two domes partially containing device.

Regarding **claim 104**, each of Nakata's domes is mounted on a substrate (front electrode, figure 1(b):4), which forms a base of the dome.

Regarding **claim 121**, Nakata's photovoltaic device, which further includes the p material (figure 1(b):2 and 3), is mounted and electrically connected to two substrates (front and back electrodes, figure 1(b):4 and 5).

Regarding **claim 124**, one of Nakata's substrates (front electrode, figure 1(b):4), has curved cup-like depressions in which each bulb of the photovoltaic device is mounted.

Regarding **claim 126**, since Applicant has not provided a special definition of the phrase "thin film photovoltaic element," it has been read broadly to mean a photovoltaic element comprising films which are thin. The n+ film as represented in Nakata's figure 1(b) are thin compared with the bulb as whole. Therefore, Nakata's photovoltaic element is a thin film photovoltaic element.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claim 125 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Nakata** as applied to claim 121 above, and further in view of Sugawara et al. (US 6,563,041 B2), henceforth **Sugawara**.

Regarding **claim 125**, Nakata does not teach that either substrate (figure 1(b):4 or 5) has reflective means. However, Sugawara teaches a similar photoelectric device in which the lower electrode (figure 1:1) has a reflective surface (figure 1:1a) designed to enhance the device's efficiency of photoelectric conversion (4:12-18). Therefore, it would have been obvious to one of ordinary skill in the art to incorporate reflective means into the device taught by Nakata because Sugawara teaches using reflective means to make the device more efficient.

Claims 102-103 and 106-107 rejected under 35 U.S.C. 103(a) as being unpatentable over **Mlavsky** (US 4,078,944) in view of Middleton et al. (US 3,411,050), Henceforth **Middleton**.

Regarding **claim 102**, Mlavsky teaches a device with a curved envelope (figures 1 and 2:16). Plural photovoltaic elements (figure 2:10) lie indirectly on the envelope, supported directly by intermediary mounting elements (figure 2:18).

Mlavsky does not teach that the photovoltaic elements are made plural layer of film. However, Mlavsky gives a list of patents that teach the structure of solar cells (3:16-20). Among these patents, Middleton teaches a solar cell that is made of a cadmium sulfide film (2:53) and backing of metal foil (2:34), a foil being a film. Therefore it would have been obvious to one of ordinary skill in the art to incorporate into the apparatus taught by Mlavsky a photovoltaic element comprising plural layers of film because Mlavsky indicates Middleton as a teaching of solar cell structure. *Alternatively*, it would have been obvious to combine the plural layers of film with the structures taught by Mlavsky in order to achieve predictable results with a reasonable expectation of success.

Regarding **claim 103**, the very top of Mlavsky's envelope (figure 1:16) forms a dome.

Regarding **claim 106**, Mlavsky teaches a wire, which is an electronic apparatus (figure 2:14A). The wire is connected to the photovoltaic element (figure 2:10), which provides the wire with electric power.

Regarding **claim 107**, Mlavsky's wire is a transmitter because it *transmits* energy from the solar cell to the terminals (figure 2:28A, 28B).

Claims 102-103, 126 and 130 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Bender** (US 3,844,040) in view of **Escoffery** (US 3,005,862).

Regarding **claim 102**, Bender teaches a device with a curved envelope (figure 2:32). On the inner surface of the envelope are plural photovoltaic elements (solar

cells, figure 2:18), each of them comprising at least one layer of material. Because there are plural elements, each formed of at least one layer, plural layers are taught.

Bender does not specify that the photovoltaic elements are made of layer of *film*. However, Bender indicates that the solar cells are conventional in structure and names Escoffery's as an example (3,005,862, 2:11-14). Escoffery teaches a "typical solar cell" (figure 2:4) made of layers of film (figure 2:5-7). Therefore, it would have been obvious to one of ordinary skill in the art to combine a film structure with the structures taught by Bender in order to achieve predictable results with a reasonable expectation of success.

Regarding **claim 103**, Bender's envelope (figure 2:32) forms a dome.

Regarding **claim 104**, Bender's dome (figure 2:32) is mounted on a substrate (figure 2:14) which is a base of the dome.

Regarding **claim 126**, since Applicant has not provided a special definition of the phrase "thin film photovoltaic element," it has been read broadly to mean a photovoltaic element comprising films which are thin. Escoffery teaches films that are thin (figure 2:5-7).

Regarding **claim 130**, Bender teaches a resilient material that secures the solar cells and makes the helmet rigid (1:29-31).

Claims 102-103, 105-106, 110 and 130 are rejected under 35 U.S.C. 103(a) as being unpatentable over Simburger (US 6,127,621), henceforth **Simburger 621**, in view of **Ellion** (US 4,710,588).

Regarding **claim 102,** Simburger 621 teaches a photovoltaic device (power sphere, title) including plural layers of film (thin film flexible solar cells, 3:65, figure 1:12a) formed on a curved surface (figure 1:11).

Since Simburger 621 does not specify whether the solar cell film layers are on the inside or the outside of the curved surface, it is not clear whether Simburger 621's power sphere includes a curved envelope with the film layers on its inner surface. However, Simburger 621's power sphere is a space satellite (1:35-36) and Ellion teaches that solar cells destined for space travel are typically covered with glass in order to shield them from physical or radiation damage (1:68-2:4). Therefore, it would have been obvious to one of ordinary skill in the art to cover the film layer solar cells taught by Simburger 621 with an envelope because Ellion teaches covering space solar cells in order to protect them. Since Simburger 621 teaches that the flexible solar cells conform to the power sphere's curved surface (3:22-25), it would have been obvious to one of ordinary skill in the art to make curved any envelope covering the cells either continuously or discretely.

Regarding **claim 103**, any contiguous half of Simburger 621's solar cell array forms a dome. For example, a dome is shown in figure 1. Based on the reasoning provided in the rejection of claim 102, the portion of the envelope surrounding that half of the solar cells would also be a dome.

Regarding **claim 105**, based on the reasoning provided in the rejection of claim 102, the envelope would be spherical.

Regarding **claim 110**, Simburger 621's power sphere includes an energy storage device (lithium ion battery, 8:46-47).

Regarding **claim 126**, Simburger 621's photovoltaic elements are thin film solar cells (3:65).

Regarding **claim 130**, Simburger 621's power sphere contains two-millimeter polyamide film (8:64-65), which both secures the solar cells and provides mechanical rigidity.

Claim 106 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Ellion** as applied to claim 102 above, and further in view of Simburger et al. (US 6,284,966), henceforth **Simburger 966**.

Simburger 621 teaches a group of electronic parts which are directly or indirectly connected to the solar cells (all the devices shown in figure 2). Any one of those parts or sets of those parts can be the electronic apparatus. While Simburger 621 specifically teaches that electric (current) power from the solar cells is supplied to the regulated bus (1:61-63), it would have been obvious to one of ordinary skill in the art to see that all the electronic parts of the power sphere which require power were supplied by either directly or indirectly by the solar cells because solar cells' *raison d'être* is to supply power and solar power is the most reliable power available in space.

Simburger 621 does not positively teach that any of these electronic devices is *within* the sphere. However, Simburger 966, which is related to Simburger 621 (Simburger 966, 1:9-11), teaches placing the payload inside the sphere (2:47, figure 4).

One advantage to placing the payload inside the sphere is that the sphere protects the payload from sudden changes in temperature (2:65-3:2). Therefore it would have been obvious to one of ordinary skill in the art to place the electronic devices taught by Simburger 621 within the sphere because Simburger 966 teaches placing the payload within the sphere for thermal isolation.

Claims 107-109 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Simburger 966** as applied to claim 106 above, and further in view of Knoblach et al. (US 2002/0072361 A1), henceforth **Knoblach**.

Regarding **claim 107,** Simburger 621 does not teach a transmitter. However, Simburger 621's solar cell array is part of a communications satellite (1:35-36, 2:57-58). A communications satellite typically uses a transmitter to send inform back to Earth. For example, Knoblach teaches a communications satellite (0001) that uses a transmitter (0063 middle) to send signals from the satellite. Therefore, it would have been have been obvious to include a transmitter in the electronic apparatus taught by Simburger 621 in order to make the apparatus functional as a communications satellite. Alternatively, it would have been obvious to one of ordinary skill in the art to combine a transmitter with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Regarding **claims 108-109,** Simburger 621 does not teach an antenna. However, Simburger 621's solar cell array is part of a communications satellite (1:35-36, 2:57-58). A communications satellite typically includes an antenna to facilitate

communication. For example, y teaches a spherical communications satellite with an antenna (figure 1:22) that is formed by a region of the spherical envelope (figure 1:10) and projects outwardly therefrom. An antenna is inherently conductive because, in order to function as an antenna in this context, it must conduct either electrons or signals. Therefore, it would have been obvious to one of ordinary skill in the art to include an antenna as claimed in the apparatus taught by Simburger 621 in order to enable the communications satellite to function as such. Alternatively, it would have been obvious to one of ordinary skill in the art to combine an antenna as claimed with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Regarding **claim 112**, Simburger 621 does not teach a sensor. However, Simburger 621's solar cell array is part of a communications satellite (1:35-36, 2:57-58). A communications satellite requires sensors to receive information from its remote environment and from its ground control center. For example, Knoblach teaches a communications satellite with multiple sensors: sensors to regulate the satellite's function (battery temperature sensor, payload temperature sensor, attitude sensor, 0066 bottom) and sensors to collect information that will be sent back to Earth (meteorological sensors, 0070 bottom of page 10). Sensors help the satellite function and achieve its communications mission. Therefore, it would have been obvious to incorporate a sensor into the apparatus of Simburger 621 in order to enable the communications satellite to function as such.

Regarding **claim 113**, the reasons for including a sensor are given in the rejection of claim 112. Simburger 621 does not provide a reason for having the sensor extend outside the envelope. However, as Knoblach teaches, communications satellites can be used to collect information about their local environment. Knoblach's satellite collects weather information (ambient temperature, ambient pressure, ambient humidity, 0070 bottom of page 10) using a meteorological package (figure 10:82). In order to gather this information, the sensing device must be exposed to the external environment. It would have been obvious to one of ordinary skill in the art to situate a sensor on any satellite on its outside so that the sensor might collect information about the external environment. Therefore, it would have been obvious to one of ordinary skill in the art to have the sensor in Simburger 621's apparatus extend outwardly from the envelope so that it might collect information from outside the envelope.

Regarding **claim 114**, Applicant has claimed a mote. Since "mote" is not a word commonly used in the solar cell art, the examiner has relied on Applicant's specification to define "mote." According to Applicant, a mote is a miniature wireless sensor [0017] comprising a sensor [0019], a data processor [0020], a transmitter [0021], a receiver [0022] and a power source that includes an energy store and a photovoltaic element [0023].

Simburger 621 teaches a miniature wireless device (microsatellite or nanosatellite, 1:26) comprising a power source that includes an energy store (lithium ion battery, 8:46-47) and a photovoltaic element (crystalline or thin film flexible solar cells, 3:65).

Simburger 621 does not positively teach a sensor. However, Simburger 621's invention is part of a communications satellite (1:35-36, 2:57-58). A communications satellite requires sensors to receive information from its remote environment and from its ground control center. For example, Knoblach teaches a communications satellite with multiple sensors: sensors to regulate the satellite's function (battery temperature sensor, payload temperature sensor, attitude sensor, 0066 bottom) and sensors to collect information that will be sent back to Earth (meteorological sensors, 0070 bottom of page 10). Sensors help the satellite function and achieve its communications mission. Therefore, it would have been obvious to incorporate a sensor into the apparatus of Simburger 621 in order to enable the communications satellite to function as such.

Simburger 621 does not positively teach a data processor, a transmitter or a receiver. However, these are essential parts of a communications satellite. Transmitters and receivers make the communication possible and a data processor is required to translate the signals into information and vice versa. The data processor is also needed to regulate functions within the satellite. Knoblach teaches a data processor, a transmitter and a receiver [0063] as key components of a functional communications satellite. Therefore it would have been obvious to one of ordinary skill in the art to incorporate these elements into the apparatus taught by Simburger 621 in order to make it work as a communications satellite.

Regarding **claim 115,** Simburger 621 teaches that the flexible solar cells are disposed on two-millimeter polyamide film (8:63-65). Therefore, at least some portion of the device, if only the internal payload, is enclosed in a resilient cover.

Regarding **claim 116,** Simburger 621's spherical shape (title) is aerodynamic.

Claim 111 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Ellion** and **Knoblach** as applied to claim 110 above, and further in view of **Nazri** (US 5,826,743).

Regarding **claim 111**, Simburger 621's energy storage device is at the center of the power sphere (8:49-50), the center being proximate to the solar cells. Simburger 621 does not teach that the energy storage device is made of thin layers. However, Simburger 621's invention is related to micro- and nanosatellites (1:26) and Simburger 621 teaches using a lithium ion battery as an energy storage device (8:46-47). Nazri teaches making a lithium ion battery (title, 2:7) made of thin layers for situations where miniaturization is important (thin film, 2:2-26, figure 1). Therefore it would have been obvious to one of ordinary skill in the art to use an energy device made of thin layers in the apparatus taught by Simburger 621 because said apparatus is small and Nazri teaches making thin-layer batteries for miniature applications.

Claims 117-118 and 120 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Ellion** and **Knoblach** as applied to claim 114 above, and further in view of **Skov** (US 3,258,223).

Regarding **claim 117**, Simburger does not teach a means for orienting the device. However, Skov teaches that, for certain applications, such as reconnaissance, surveillance and communications, it is important that an artificial satellite be oriented in a particular direction with respect to the center of its orbit (1:17-26). Therefore it would have been obvious to one of ordinary skill in the art to include a means for orienting the device taught by Simburger because Skov teaches that attitude control is important for the satellite to accomplish its mission.

Regarding **claim 118**, Skov offers an effective orienting means a system that involves at least two centers of gravity: the centers of gravity of the spherical weights (figure 1:12 and 14) and the center of gravity of the satellite itself (2:31-32). These centers of gravity are, of course, predetermined by where the masses are located. Therefore it would have been obvious to one of ordinary skill in the art to combine an orienting means that includes a predetermined center of gravity with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Regarding **claim 120**, Skov's conducting masses are located as far from the satellite's center of gravity as is practicable (2:31-32). The masses (figure 1:12 and 14) are pressed by electrical forces against the interior of an outer shell of the satellite. The portion of each mass that is pressed against this shell sticks to or adheres to the shell, which makes that portion an adhesive portion. While the surface to which the mass sticks is not the outer*most* surface, it is an outer surface of the device because it is a surface of the outermost layer of the device.

Claims 118-119 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Ellion**, **Knoblach** and **Skov** as applied to claim 117 above, and further in view of **Etkin** (US 3,268,183).

Regarding **claim 118**, as explained in the rejection of claim 117, Skov provides a rationale for using an orienting means. First, Etkin teaches an effective orienting means that uses a gravity gradient (1:29-30). The use of a gravity gradient inherently requires that there be a predetermined center of gravity of the device. Second, Etkin also exploits the center of gravity of a weight (figure 3:58) attached to the satellite. Therefore it would have been obvious to one of ordinary skill in the art to combine an orienting means that includes a predetermined center of gravity with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Regarding **claim 119**, Etkin teaches an effective orienting means that includes plural rods (figure 1:12-17) projecting outwardly from the satellite body. One advantage of the outward projection is that it enables the stabilizing rods to double as antennae (2:18-19). Therefore, it would have been obvious to one of ordinary skill in the art to have the orienting means project outwardly from Simburger 621's device because Etkin teaches doing so to use the means as antennae. *Alternatively*, it would have been obvious to one of ordinary skill in the art to combine an outwardly projecting orienting means with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Claims 127-129 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Simburger 621** in view of **Ellion** as applied to claim 126 above, and further in view of Ikeda et al. (WO 03/005,481), henceforth **Ikeda**. All references to Ikeda are to its English language equivalent, US 2004/0187918 A1.

Regarding **claim 127**, Simburger 621 does not teach dye solar cells (DSCs). However, Ikeda teaches that dye solar cells are efficient at energy conversion and can be made inexpensively (page 1 paragraph 0003). Therefore it would have been obvious to one of ordinary skill in the art to incorporate DSCs in the apparatus taught by Simburger 621 because Ikeda teaches that are efficient and can be made cheaply. *Alternatively*, it would have been obvious to one of ordinary skill in the art to combine DSCs with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success.

Regarding **claim 128**, Simburger 621 does not teach an electrode that comprises carbon. However, Ikeda teaches using a carbon counter electrode because carbon is conductive and catalyzes the reduction of the redox electrolyte (page 51 paragraph 0385 second half). Therefore, it would have been obvious to incorporate a carbon electrode into the apparatus taught by Simburger 621 because Ikeda teaches that carbon conducts electrons and catalyzes the redox reaction. Alternatively, it would have been obvious to one of ordinary skill in the art to combine a carbon electrode with the structures taught by Simburger 621 in order to achieve predictable results with a reasonable expectation of success. The electrode in Simburger 621's solar cells would

be internal because the cells, based on the reasoning explained in the rejection of claim 1, are inside the envelope.

Regarding **claim 129,** Ikeda teaches a semiconductor thin film (page 50 paragraph 0373), a redox electrolyte, and an electrode (page 51 paragraph 0385). The electrolyte resides between the thin film and the electrode. The space between the thin film and the electrode is a reservoir.

Allowable Subject Matter

Claims 122-123 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Claim 122-123 depend on claim 121. The closest prior art of record that anticipates claim 121 is Nakata.

Regarding **Claim 122**, Nakata teaches two channels through the envelope (figure 1(b):7), each channel occupied by a bulbous section of the p region (figure 1(b):3). However, while the p region is partially conductive, the channel does not lead to a conductive layer of the device and there is no conductor. Nor would it have been obvious to one of ordinary skill in the art to include these features in Nakata's apparatus.

Regarding **claim 123,** the substrates in Nakata are the front electrode (figure 1(b):4) and the back electrode (figure 1(b):5). These electrodes do not include a grid

and it would not have been obvious to one of ordinary skill in the art to make them into a grid.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Magali P. Théodore whose telephone number is (571) 270-3960. The examiner can normally be reached on Monday through Friday 9:00 a.m. to 6:30 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer K. Michener can be reached on (571) 272-1424. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer K. Michener/
Supervisory Patent Examiner, Art Unit 1795

/Magali P. Théodore/
Examiner, Art Unit 1795